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# The Theory of Socially Embedded Games: Applications and Extensions to Open and Closed Games \*

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**Abstract.** An earlier article, drawing on the mathematical theory of rules and rule complexes, extends and generalizes game theory (*GGT*). The theory has been used to conceptualize and analyze diverse social relationships, roles, and games as particular types of rule complexes. For instance, a social role, as a major basis of a parent's action in a game, consists of at least four key components – which are mathematical objects – in the determination of action: value complex, model of reality (including beliefs and knowledge bases), a repertoire of acts, routines, programs, and strategies, and modality, a role-specific algorithm for determining or generating action in game settings. This article applies and extends *GGT* in analyses of a market bargaining game (a type of open game) and of the classical game of prisoners' dilemma (a type of closed game). The applications show the concrete effects of social embeddedness on game structuring, game interaction patterns and outcomes, and social equilibria.

**Key words:** role, value complex, model, action repertoire, normative equilibria, open and closed games

## 1. Introduction

The generalized theory of games (*GGT*) conceptualizes and analyzes different types of social relationships, roles, and games as rule complexes. A well-specified game is one where for a particular interaction situation, the actors have defined roles and role relationships (although not all games are necessarily well-defined with, for instance, clearly specified and consistent roles and role relationship(s)). The notion of a *situation* is a primitive. Situations are denoted by  $S$  with subscripts, if needed. We use the lowercase  $t$ , possibly with subscripts, to denote points of time (or reference). Thus,  $S_t$  denotes a situation at time  $t$ . Given a situation  $S_t$ ,

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for every actor  $i$  we can associate a rule complex  $ACTOR(i, t)$ , containing all rules the actor  $i$  has in  $S_t$ . We refer to this rule complex as  $i$ 's *actor complex* at  $t$ . Some rules of  $ACTOR(i, t)$  relate to  $i$ 's roles at  $t$ . If we neglect or delete the rules that are irrelevant for the topic 'role', we obtain a subcomplex  $ROLE(i, t)$  of  $ACTOR(i, t)$ , written  $ROLE(i, t) \subseteq_g ACTOR(i, t)$ , referred to as the *role complex* of  $i$  at  $t$ . In general, actors are involved in a number of social relationships and institutional domains and play a number of different roles. Suppose that actor  $i$  has several roles at  $t$  such as citizen, supervisor, wife, and mother. By deleting irrelevant rules, we may obtain derived *subcomplexes* of  $ROLE(i, t)$  specific for particular roles, for instance, a role complex of supervisor in the game(s)  $G_W(t)$  named 'work',  $ROLE(i, t, G_W)$ , a role complex of mother in the game(s)  $G_F(t)$  named 'family',  $ROLE(i, t, G_F)$ , etc. all related to a point of time  $t$ . Apart from specific role complexes like  $ROLE(i, t, G_W)$  and  $ROLE(i, t, G_F)$ ,  $ROLE(i, t)$  also contains other rules (or rule complexes) like meta-rules describing and regulating, among other things, any of the interdependencies between  $ROLE(i, t, G_W)$  and  $ROLE(i, t, G_F)$ .

Given a concrete situation  $S_t$ , a general game is represented as a particular rule complex  $G(t)$  defining the players' roles along with relevant norms and other rules. Suppose that a group or collective  $I = \{1, \dots, m\}$  of actors is involved in a game  $G(t)$ . As previously,  $ROLE(i, t, G)$  denotes the actor  $i$ 's role complex in  $G(t)$ . On the other hand,  $ROLE(I, t, G)$  denotes a role complex or configuration of all actors engaged in  $G(t)$ . For every  $i = 1, \dots, m$ ,  $ROLE(i, t, G)$  is a subcomplex of  $ROLE(I, t, G)$  and the latter role complex is a subcomplex of  $G(t)$ , i.e.,

$$ROLE(i, t, G) \subseteq_g ROLE(I, t, G) \subseteq_g G(t) \quad (1)$$

which may be also written as follows:

$$G(t)[ROLE(I, t, G)[ROLE(1, t, G), \dots, ROLE(m, t, G)]] \quad (2)$$

It should be emphasized that the rule complexes  $ROLE(I, t, G)$  and  $G(t)$  also contain other rules (or rule complexes) which describe and regulate the game such as the 'rules of the game', general norms, practical rules such as initiation and stop rules as well as meta-rules, indicating, for instance, how seriously or strict the roles and rules of the game are to be implemented, and possibly the ways to adapt or to adjust the rule complexes to particular situations.

Any game defined as the complex  $G(t)$  involves a set  $I$  of actors who (1) are conscious of being involved in an interaction with others and (2) operate more or less according to a common rule complex, that is share *common knowledge* of the game complex including their respective roles vis-à-vis one another as well as specific rules of the game. For our purposes here, a simple, well-defined game is one in which each player occupies a single specified role.

Role relationships provide contextizing frames of appropriate values and norms, the particular ways in which actions are classified and judged, and internal interpretations and meanings (Burns and Flam, 1987). 'Non-cooperation' in, a

prisoners' dilemma for instance, (*PD* for short) situation may not be merely 'defection' in the case that the actors are friends or relatives in a solidary relationship, but a form of 'disloyalty' or 'betrayal' and subject to harsh social judgment and sanction. In the case of enemies, 'defection' would be expected and considered 'natural' – neither shameful nor contemptible, but right and proper rejection of or damage to the other. Such a perspective on games enables us to systematically identify and analyze their symbolic and moral aspects associated with established relationships.

An actor's role is specified in *GGT* in terms of a few basic cognitive and normative components (formalized as mathematical objects in (Burns and Gomolińska, 1998; Burns et al., 1998; Gomolińska, 1999)). A role consists of a rule complex which includes, among other things: particular rules or beliefs that frame and define the reality of relevant interaction situations; norms and values relating, respectively, to what to do and what not to do, and what is good or bad; repertoires of strategies, routines; and modalities to organize the determination of decisions and actions in relation to particular other agents.

We limit ourselves here to consideration of four key role components:

- (1) A **value complex**  $VALUE(i, t)$  – the actor  $i$ 's values, goals, and commitments at  $t$ .  $VALUE(i, t)$  consists of evaluative rules assigning value to things, states of the world, deeds, and people, defining, among other things, what is 'good', 'bad', 'right', 'wrong', 'acceptable', 'unacceptable'. Also included are norms indicating definitive do's and don'ts which form a **norm complex**  $NORM(i, t) \subseteq_g VALUE(i, t)$ . And, finally, there are meta-values or principles, which may indicate ways to address conflicts or contradictions between different values or norms, giving priority to some over others or calling for the incumbent to exercise good judgment in addressing such issues. The value complex is the ultimate source of motivation in action – the basis of 'will' or 'drive'. It motivates action in part by orienting and committing them to pursuing the 'good' or 'right and proper' states of the world, and to avoiding or opposing that which is 'bad'. Values as well as norms define ideal situations, states of affairs, people, relationships, and actions as well as interactions.
- (2) A **model** or belief structure of reality of the actor  $i$  at  $t$ ,  $MODEL(i, t)$ , is the actor's 'situational view', providing her perspective on, and a basis for understanding the reality of the interaction situation  $S_t$ .  $MODEL(i, t)$  consists of rules representing the beliefs the actor  $i$  has about herself and her environment, relevant others, interaction conditions, and constraints. For instance, the model may include beliefs about others' expectations or strategic predispositions.
- (3) An **action complex**  $ACT(i, t)$  includes acts, routines, programs, and strategies with which to respond to – or deal with – problems and challenges in the context of  $S_t$  (including the specific context of particular roles and role relationships).
- (4) There is one or more particular action modes, that is,  $MODALITY(i, t)$ , for generating or determining action. A modality is a rule complex with at least one

algorithm and a meta-value for forming, generating or determining action. The meta-value provides the organizing principle of a modality, defining a basis of higher order judgment and selectivity. It indicates in the action determination process, which rules, norms, values, and algorithms are most appropriate to apply in the process. For example, in a given interaction context, an actor may be particularly oriented to normative action, and focuses on, monitors, and stresses relevant norms and their implementation or realization in the situation. This makes for the actor's logic of action in this context.

As analyzed elsewhere (Burns and Gomolińska, 2000), there are several possible modalities. Among the important types of modality are those of consequentialism or instrumental rationality, normatively oriented action, ritual and communication, play, and combinations of these. Each modality entails a logic of generating or determining action with a particular judgment 'calculus', requiring specific information as input and generating judgmental and action outputs. A modality is identified or characterized by its over-riding logic for determining or generating action. It is a particular way of paying attention and organizing and selecting situational data in  $S_t$  (certain types of data, variety and complexity of data), activating certain rule complexes and applying particular values, norms, and routines, and making judgments and determining action.

The concepts of  $VALUE(i, t)$ ,  $MODEL(i, t)$ ,  $ACT(i, t)$ , and  $MODALITY(i, t)$  are elaborated and applied in the following sections of the article. The components of a role complex  $ROLE(i, t)$  are specified at time  $t$  as follows:

$$ROLE(i, t)[VALUE(i, t), MODEL(i, t), ACT(i, t), MODALITY(i, t)] \quad (3)$$

Substituting the role specifications of (3) into (2) for a given game  $G(t)$ , we obtain

$$(i, t, G)[ROLE(i, t, G)[VALUE(i, t, G), MODEL(i, t, G), ACT(i, t, G), MODALITY(i, t, G)]] \subseteq_g ROLE(I, t, G) \subseteq_g G(t) \quad (4)$$

where

$$ROLE(I, t, G)[ROLE(1, t, G), \dots, ROLE(m, t, G)] \quad (5)$$

and for each  $i = 1, \dots, m$ , we have that:

$$ROLE(i, t, G)[VALUE(i, t, G), MODEL(i, t, G), ACT(i, t, G), MODALITY(i, t, G)] \quad (6)$$

A preceding article (Burns and Gomolińska, 2000) has shown that classical games are special cases of  $GGT$ , namely closed games with particular, anomic type social relationships among players. Closed game situations with specified alternatives and outcomes are distinguishable from open game situations. In the latter case, actors may construct and elaborate strategies and outcomes in the course

of interaction, for instance in the case of a bargaining game in market exchange. In such bargaining processes, social relationships among the actors involved – relations of anomie, rivalry, or solidarity – guide the construction of options and the patterns of interaction and outcomes.

Open and closed games are distinguishable in terms of the properties of the action complex,  $ACT(I, t, G)$  for the group of players  $I$  (Burns and Gomolińska, 2000). In closed game conditions,  $ACT(i, t, G)$  is specified and invariant for each actor  $i$ ,  $i \in I$ , situation  $S_t$ , and game  $G(t)$ . Such closure is characteristic of classical games (as well as parlour games), whereas most real human games are open. In open games, the actors participating in  $G(t)$  construct or ‘fill in’  $ACT(I, t, G)$ , as, for example, in a bargaining process where the actors alter their strategies or introduce new strategies during the course of their negotiations. In general, for each actor  $i \in I$ , her repertoire of actions,  $ACT(i, t, G)$ , is constructed in the course of her interestation by her (and possibly others) in accordance with the norms and values relevant to her role at  $t$ . The applications of *GGT* to open as well as closed games illustrates the concrete effects of social embeddedness on game structures and processes, in particular the impact of social relationships on the interaction patterns and outcomes, as illustrated in the following sections.

## 2. Market Bargaining: Two-person Open Game

Market bargaining is a relatively open interaction process. Key *GGT* concepts that may be applied in the analysis of such bargaining are: (1) **models** of the participants, Buyer and Seller; in the bargaining process they have or construct beliefs about what the other actor expects or would accept;<sup>1</sup> (2) **value** complexes which contain evaluative rules about the minimum or reserve price which Seller will accept and the maximum price, value, which Buyer will pay; (3) the **action repertoires** of the actors, which here are assumed to be open and flexible. They may contain activities of exchanging information, making offers and bids, and trying to reach – or rejecting – agreement on a particular price level, and attempts to deceive or bluff, among other actions; (4) **modality**, which may be routine, simply the application of an algorithm, or which may involve non-routine judgments and decisions, e.g., determination of an action realizing a norm or instrumentally achieving a particular state of the world.

Assume two participants are engaged in bargaining with pre-determined value limits: a reserve or minimum price,  $x_{\min}$ , for Seller and a value or maximum price,  $x_{\max}$ , for Buyer. These two levels delimit the bargaining space (the price range within which an exchange is feasible),  $x_{\min} \leq x \leq x_{\max}$ . Of course, if  $x_{\min} = x_{\max}$ , the bargaining space consists of this value alone, allowing ‘no room’ for bargaining. Instrumental egoists would be oriented to the various outcomes in a bargaining space where  $x_{\min} < x_{\max}$ . Seller would prefer the highest conceivable price, at least to the extent she were unconcerned about Buyer’s welfare. Similarly, without concern for Seller, Buyer would prefer the lowest possible price. Each

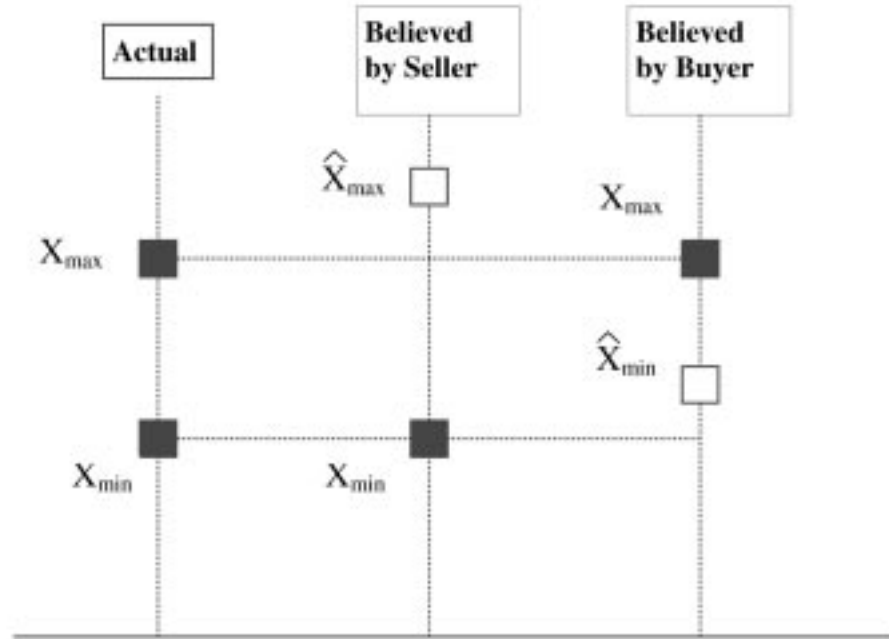


Figure 1. Buyer and Seller negotiation space.

knows the bargaining space is bounded, but does not know with any certainty the bounds, unless somehow informed, what the other will, or can, accept.

Seller uses any previous knowledge available concerning Buyer, including available statistics about, for instance, Buyer's income and general lifestyle as a basis for an estimate or hypothesis concerning Buyer's maximum willingness to pay and the outcome(s) likely to be acceptable to her. This is the major basis of Seller's plan and strategic behaviour *vis-à-vis* Buyer. Buyer, who may, possibly, have access to general information about Seller's costs, mark-up formulas, etc. (e.g., from consumer-oriented publications), will also try to hypothesize about Seller's demand limits and formulate an estimate of Seller's acceptable outcomes. These will serve as the basis for Buyer's bargaining strategy and plans.

Thus, the actors each construct (or activate) beliefs or initial estimates of the limits of the bargaining space. Seller will construct an estimate  $\hat{x}_{\max}$  of Buyer's  $x_{\max}$  and, similarly, Buyer will form an estimate  $\hat{x}_{\min}$  of  $x_{\min}$ . In the course of their communicative bargaining, the actors continually try to formulate improved estimates of these parameters in their search for a possibly mutually agreeable transaction. The estimates,  $\hat{x}_{\min}$  and  $\hat{x}_{\max}$  may be very rough, incomplete, and often understood or experienced as highly uncertain by the two actors.

The actual bargaining space and its two estimates are given below and shown schematically in Figure 1.

$$\text{Actual: } x_{\min} \leq x \leq x_{\max}$$

$$\text{For Seller: } x_{\min} \leq x \leq \hat{x}_{\max}$$

$$\text{For Buyer: } \hat{x}_{\min} \leq x \leq x_{\max}$$

As Buyer assigns value  $x_{\max}$  to  $X$ , purchase of  $X$  at a price  $x < x_{\max}$  represents a gain of  $x_{\max} - x$  to Buyer. Similarly, if  $x_{\min} < x$ , the transaction provides a gain to Seller of  $x - x_{\min}$ . It is reasonable to assume (if we ignore, for the moment, possible sentiments of attachment or repulsion between the actors) that, in general, both Buyer and Seller will prefer outcomes which, all else being equal, provide them with the larger gain. In analyses based on classic game theory (see Rasmussen, 1989) these gains are referred to as “the utilities of Buyer and Seller, respectively, for an exchange at price  $x$ ”. As rational egoists, each is assumed to seek prices which will maximize her expected utility. If the two actors act cooperatively and agree to exchange at a price which will maximize  $(x - x_{\min})(x_{\max} - x)$ , they will arrive at a mutually acceptable exchange price.

Assume rational egoists: (1) who adhere to (or are possibly forced by social pressure to adhere to) a norm of honesty; and (2) where Buyer wants to maximize  $x_{\max} - x$ , and Seller wants to maximize  $x - x_{\min}$ . In a business-like way, the actors bargain and decide to cooperate in determining a price which will jointly and readily maximize their gain, that is  $(x - x_{\min})(x_{\max} - x)$ , because they know that bluffing may prolong bargaining, risk aborting a mutually beneficial business deal, and possibly damage future relations. So they lay their cards on the table and proceed to obtain  $x^* = (x_{\min} + x_{\max})/2$  as the mutually acceptable exchange price.<sup>2</sup>

Consider now the case where the actors lack complete information – for instance, they cannot or will not lay their cards on the table. If, as *GGT* has assumed, the actors operate with distinct beliefs (or estimates) of the situation where Buyer has a belief or estimate  $\hat{x}_{\min}$  of  $x_{\min}$  and Seller a belief  $\hat{x}_{\max}$  of  $x_{\max}$ , then they will propose divergent prices (in the absence of direct, open communication about their real demands), even under conditions where they wish to act cooperatively and effectively.. For instance, Buyer bids price  $x_B^* = (\hat{x}_{\min} + x_{\max})/2$  and Seller offers  $x_S^* = (x_{\min} + \hat{x}_{\max})/2$ . The likely resolution of their “differences” depends upon the context of the interaction, as discussed in more detail below.

Bargaining and exchange processes are socially embedded. In addition to general market rules, actors have specific social or interpersonal relationships which partially define and shape their market exchange judgments and interactions. In each case the actors are assumed to operate under incomplete knowledge in part reflected here by Buyer’s and Seller’s estimates,  $\hat{x}_{\min}$  and  $\hat{x}_{\max}$ , of the bargaining



parameters  $x_{\min}$  and  $x_{\max}$  of Seller and Buyer, respectively. Given their incomplete information, Buyer will view an exchange at price  $x$  as yielding gains of

$$\begin{aligned} & x_{\max} - x \text{ to Buyer and} \\ & x - \hat{x}_{\min} \text{ to Seller.} \end{aligned}$$

Seller, on the other hand, will view the same exchange as providing gains of

$$\begin{aligned} & \hat{x}_{\max} - x \text{ to Buyer and} \\ & x - x_{\min} \text{ to Seller.} \end{aligned}$$

These assessments play an important role in the actors' judgment of their options. In the simplest case, Buyer asks "Is  $x \leq x_{\max}$ ?", i.e., "Is it worth it?" or "Can I afford it?", and Seller asks "Is  $x \geq x_{\min}$ ?", i.e., "Will I make my minimum profit?". In other situations, the actors may seek to increase or decrease their 'gain' relative to that of the other actor. They may place a high value on bargaining skill, e.g., "I never pay the asking price", and, therefore, focus on more than the current price in their bargaining decisions. Indeed, in many cultures elaborate bargaining is an integral part of a market exchange process.

Actors' perceptions and evaluations regarding a suitable exchange price is influenced by the social context in which bargaining takes place, in particular the established social relationships between the actors. Here we examine bargaining embedded in three distinct social contexts, illustrating the impact of social relationships on bargaining processes and outcomes. The three social contexts are: *egotistic instrumental bargainers*, *friends* or actors with a solidary relationship, and bargaining between *agents in a competitive relationship* (or in a social situation culturally defined as competitive).

## 2.1. RATIONAL EGOISTS

Under a pure market rule regime, the bargainers would each try to make gains for herself: Buyer to pay less than the maximum value  $x_{\max}$  and Seller to gain more than the minimum provided by the reserve price  $x_{\min}$ . A minimal condition for a transaction to take place at price  $x^*$  is that

$$x_{\min} \leq x^* \leq x_{\max}. \quad (7)$$

The final settlement, the exact value of  $x^*$  if they manage to reach agreement, will depend on tactics and skills of bluffing and deception, their skills of persuasion, their models of one another with which they enter the negotiation or which they develop during its course. Successful lying (for example, about their respective limit prices) would enable a negotiator to improve his or her gains. This is to conceal (or 'not reveal') true preferences.

If we return to the general case in which Buyer's estimated bargaining space is  $\hat{x}_{\min} \leq x \leq x_{\max}$  and Seller's estimated bargaining space is  $x_{\min} \leq x \leq \hat{x}_{\max}$ , then

the objective ‘fair price’ might be  $x^* = (x_{\min} + x_{\max})/2$ . However, if Seller has been able to persuade Buyer that Seller’s costs are larger, that is  $\hat{x}_{\min} > x_{\min}$  (she may do this, for example, by informing the Buyer of the ‘manufacturer’s recommended price’), then Buyer’s estimate of a ‘fair’ price would be  $x_B^* = (\hat{x}_{\min} + x_{\max})/2$ , which is greater than  $x^*$ . Thus, a transaction at  $x^*$  would be viewed as acceptable to Buyer. Similarly, if Buyer is able to mislead Seller into an estimate  $\hat{x}_{\max} < x_{\max}$  of her value or maximum price level, then Seller’s estimate of a ‘fair’ price,  $x_S^* = (x_{\min} + \hat{x}_{\max})/2$ , would be smaller than  $x^*$  and a transaction at  $x^*$  is viewed as a suitable gain by Seller. Clearly, it is possible, under certain circumstances, for each participant to feel that she achieves ‘the best of the bargain’.

Such bargainers have some common and some conflicting interests, that is, the situation is a mixed motive setting with characteristics of the *PD* game (Buckley et al., 1974; Burns, 1990). They both want to trade, but their interests conflict concerning the terms of their exchange, i.e., the exact price at which the exchange might be settled. As suggested above, the actors activate or develop beliefs or estimates about one another’s satisficing levels and about the likely outcome(s) acceptable to both. Seller, in the example above, might believe that she can sell an item *X* at a price over  $x_{\min}$ ,  $x_{\min} + y$ , while Buyer believes that she might be able to negotiate a transaction at a price of  $x_{\max} - z$ . Thus, Seller through her communications and behavior articulates  $x_S = x_{\min} + y$ , which influences Buyer’s belief,  $\hat{x}_S$ . Similarly, Buyer tries to deceive Seller into believing that her value limit is only  $x_B = x_{\max} - z$ , which might translate into a particular belief or belief revision on Seller’s part,  $\hat{x}_B$ .

In practicing deception and bluffing about their true preferences in an effort to achieve these perceived goals, there is a certain risk that one or both actors judge that no agreement can be reached, negotiations are broken off, and a potential transaction satisfying both actors’ actual requirements fails to be realized, although, in fact, conditions were favorable, or even likely, for a satisfactory agreement.

## 2.2. BARGAINING AGENTS IN SOLIDARY RELATIONSHIPS

Actors in a friendship relationship are likely to apply a set of norms that exclude ‘exploitation’, ‘maximization of gains’, or ‘deception of the other’. Both might even prefer to avoid doing business with one another because of the risk that wheeling and dealing might poison their relationship, for example, the sale of a car which could possibly break down. Each would be predisposed to communicate more or less honestly to the other what he or she expects, that is Seller’s minimum,  $x_{\min}$ , and Buyer’s maximum,  $x_{\max}$ . However, a certain type of fabrication may enter in here as in the case of rational egoists: for instance, Seller communicates a reduced reserve price, since she is prepared to accept a loss when it concerns her friend. Moreover, Buyer communicates an augmented maximum value as part of a sacrifice for a friend. In other words, they both would be reluctant to use the type of misleading or deceptive acts and pricing strategies for monetary gains discussed

in the previous case, although they might engage in a type of deception also – for the sake of friendship – grounded on self-sacrifice (‘altruism’) rather than on the pursuit of personal monetary gains.

Actors in such a solidary relationship would consider appropriate, and be pre-disposed to apply, a norm of equity or distributive justice such as simply dividing the difference between their initial differences, settling on  $x^* = (x_{\min} + x_{\max})/2$ . An alternative procedure would be to take an established market or objective price, found in price lists or catalogs, eliminating the need for “bargaining” or calculation between them.<sup>3</sup>

Given their solidary relationship neither Buyer nor Seller would wish to exploit the other (at least they would not want to see themselves in such terms). Buyer would prefer that her estimate of Seller’s gain be at least equal to her own. That is,

$$x_{\max} - x^* \leq x^* - \hat{x}_{\min}. \quad (8)$$

Similarly, Seller would prefer that:

$$x^* - x_{\min} \leq \hat{x}_{\max} - x^* \quad (9)$$

These two inequalities together imply that an exchange price which is acceptable to both, given their solidary relationships and their estimates of the other’s situation, must satisfy

$$\frac{\hat{x}_{\min} + x_{\max}}{2} \leq x^* \leq \frac{x_{\min} + \hat{x}_{\max}}{2}. \quad (10)$$

Thus, the effect of the assumed relationship between Buyer and Seller is to alter the range of **feasible** prices, ranging from  $x_{\min}$  to  $x_{\max}$ , to the range of **acceptable** prices within the solidary bargaining field given in (10). If the two actors have accurate estimates, then (10) yields a settlement price approximating the ‘split the difference’ principle.

### 2.3. BARGAINING AGENTS IN COMPETITIVE SOCIAL RELATIONSHIPS

Here we consider agents who have an established competitive relationship or find themselves in a setting culturally defined as competitive. They each try not only to make a gain relative to their satisficing levels, as in our first example, but aim to actually ‘beat’ the other, to gain more than the other gains, in a certain sense, to ‘win’.

The strategies utilized by such actors would entail exaggerated initial bids and offers. They would be predisposed to engage in bluff and deception. Each would be unwilling to make concessions, for instance, large alterations in their current proposals during bargaining. With two ‘strong’ bargainers, pushing for the greatest advantage, the likelihood is high that bargaining would abort. Aborted negotiation

is an acceptable risk for bargainers whose primary aim is to gain more than one another (rather than simply reaching a settlement). In general, they would tend to reject objectively acceptable outcomes (that is, given their actual satisficing levels), and derail the negotiation altogether in the pursuit of relative gain or comparative advantage characteristic of competitive orientations. In other words, each would prefer either achieving a ‘win’, that is, a relative gain, or aborting the negotiation altogether over the possibility of simply making a satisfactory trade according to their objective standards or expectations outside of the context of rivalry. In short, the competitive relationship motivates Seller and Buyer to prioritize gains relative to one another. Seller prefers that  $\hat{x}_{\max} - x^* < x^* - x_{\min}$  and Buyer prefers that  $x^* - \hat{x}_{\min} < x_{\max} - x^*$ . Taken together, the two inequalities require that the exchange price satisfy

$$\frac{x_{\min} + \hat{x}_{\max}}{2} < x^* < \frac{\hat{x}_{\min} + x_{\max}}{2}. \quad (11)$$

Two such competitive actors would have great difficulty in making a deal – even if in principle there is the same potential bargaining space for them as for pure egoists. However, their minimum satisficing levels are transformed into much more demanding levels by virtue of their competitive relationship and value orientations associated with it. This yields a much restricted bargaining field, in the limit an empty bargaining space, and, hence, the likelihood of aborted bargaining. Exceptions may occur, however. The likelihood of such actors consummating an exchange is increased either when they compromise on the concept of competitive ‘gain’ or when their perceptions of one another’s minimum satisfying levels is distorted. In instances where Seller and Buyer have accurate assessments of one another’s levels and are committed to a rule of striving for relative gain, they would be unable to reach agreement (the outer terms of (11) would be equal or near equal). They would settle only if both were prepared to weaken the ‘strong’ competitive rule to pursue relative gain vis-à-vis one another, for instance by accepting a ‘50/50 split’. In this case, there is only one point at which an agreement could be consummated, namely the equilibrium price  $(x_{\min} + x_{\max})/2$ . Competitors might be disposed to make such a compromise in the competitive rule in order to accomplish substantial absolute gains promised by the exchange itself. In this case, they assign more value to the absolute gains than to realization of their competitive orientations in relative prices. The other possibility of settlement arises when the bargainers have inaccurate estimates of one another’s positions that, in a certain sense, ‘fit’ together so as to enable a settlement. The two bargainers reach agreement even with unequivocal application of competitive rule: if Seller deceives Buyer into believing that Seller’s minimum is higher than it is, that is  $x_{\min} < \hat{x}_{\min}$  and/or Buyer succeeds in deceiving Seller to distort Buyer’s maximum downward, i.e.,  $\hat{x}_{\max} < x_{\max}$ . These deceptions allow each of the actors to conclude that she has attained her objective of gaining more in the bargain than the other. Each considers herself a ‘winner’. In general, pure rivals have difficulty in reaching

Table I. Social relationships and exchange outcomes of bargaining

Relationship	Limits of exchange terms
Egoists	$x_{\min} \leq x^* \leq x_{\max}$
Friends	$(\hat{x}_{\min} + x_{\max})/2 \leq x^* \leq (x_{\min} + \hat{x}_{\max})/2$
Competitors	$(x_{\min} + \hat{x}_{\max})/2 \leq x^* \leq (\hat{x}_{\min} + x_{\max})/2$

agreement to trade – outside of the limiting cases where either they compromise their competitive rules or they bargain on the basis of distorted images of one another’s positions. In sum, the socially constructed ‘bargaining space’ (settlement possibilities) varies as a function of the particular social relationship under which the interaction takes place. Three different bargaining fields, as summarized in Table I are generated. In general, the prevailing social relationships, and particular social rules and expectations associated with these relationships, make for greater or lesser communicative distortion, greater or lesser transaction costs, and more or less likelihood of successful bargaining. The difficulties – and transaction costs – of reaching a settlement are greatest for pure competitors or rivals. They would be more likely to risk missing a settlement than pragmatic ‘egoists’. This is because ‘egoists’ are following simple, but not unrealistic, rules that effectively resolve some of the collective action dilemmas in a bargaining situation. In contrast, genuine rivals tend to suppress the potential cooperative features of the game situation in favor of pursuing their rivalry. Friends may exclude business exchange as a precaution against undermining a friendship relationship, thus blocking bargaining altogether. Or, as suggested above, if they do choose to conduct business together, they would be inclined to adopt strategies that can make for bargaining difficulties (and increased transaction costs) in reaching a settlement.

### 3. Closed Classic Games and Their Social Embeddedness

#### 3.1. INTRODUCTION

Classical type game analysis can be readily extended by considering the impact of role relationships – in part, variation in value complexes, modalities, and action repertoires – on patterns of interaction and equilibrium outcomes. Combinations of social relationships and situational conditions, defining a particular game, imply certain interaction patterns and social equilibria.

We focus on a well-known game situation, namely the prisoners’ dilemma (*PD*) game (*GGT* has also been applied to the analysis of other game types such as coordination, confrontation or ‘chicken’, and distributional games such as the ‘battle of the sexes’ (Burns et al., 1998)). A standard, simple action – outcome matrix of the *PD* game is presented in Table II. Each actor has a choice between

‘cooperative’ and ‘non-cooperative’ types of action. As indicated in Table II, the choice of one strategy by each actor leads to a jointly determined outcome, with a particular value, which could be a common shared value or might be differentiated into distinct evaluations by the two actors involved (depending on their social relationship and the framing of the game which this implies). The standard story (see, for example, Hollis (1987)) of the *PD* game is that the two actors are in the custody of the police and are suspected of a crime. The prosecutor is convinced that they are guilty but does not have enough evidence for a conviction. The prosecutor gives the two prisoners the alternatives of confessing or not. If neither confesses, he threatens to convict them both of a minor charge in any case. If they both confess, they will both be prosecuted but he will recommend a lighter than usual prison sentence. However, if one confesses and the other does not, the one that confesses will get off with a sentence less than that of the minor charge, while the one that refuses will receive the longest possible sentence. The family of *PD* games are characterized by interaction conditions where a certain level of cooperation and self-sacrifice lead to substantial gains but where there are incentives for individual actors to make greater gains by defecting rather than to cooperate through some sacrifice or contribution. The rationality of immediate pursuit of individual self-interest results in sub-optimal outcomes. The following *GGT* analysis considers the game contextualized or embedded in social relational and normative structures. The abstract action of cooperation (*C*) may entail a variety of activities: taking the wishes of the other into account, compromising, showing civility, coordinating with the other, adhering to established rules or contracts, and so forth. Non-cooperation ( $-C$ ) may encompass, for example, refusal to coordinate, unwillingness to compromise, acting contrary to the wishes of the other, trying to make gains ahead of the other, breaking a contract or a relevant norm, causing harm to the other, etc. *CC* means that both actors cooperate,  $-C - C$  that they both are uncooperative, while  $C - C$  and  $-CC$  are mixed patterns. These interactions have outcomes, symbolically represented in the matrix. An actor *i*’s evaluations or value judgments of an outcome *CC* in *S<sub>i</sub>* is represented by  $J_{\text{val}}(i, t)(CC)$  (and so forth for each and all of the outcomes in the matrix) (Burns and Gomolińska, 2000). The evaluations of outcomes (preference orderings) represent the value judgments of actors in the *PD* game. Actors 1 and 2, as rational egoists, would assess the outcomes as follows, respectively:

$$\begin{aligned}
 J_{\text{val}}(1, t)(-CC) &> J_{\text{val}}(1, t)(CC) > J_{\text{val}}(1, t)(-C - C) > J_{\text{val}}(1, t)(C - C) \\
 J_{\text{val}}(2, t)(C - C) &> J_{\text{val}}(2, t)(CC) > J_{\text{val}}(2, t)(-C - C) > J_{\text{val}}(2, t)(-CC)
 \end{aligned}
 \tag{12}$$

Other judgment patterns are identified and analyzed below in connection with several other types of social relationships.

Table II. Game matrix for 2-actor *PD* game

		ACTOR 2	
		Cooperate(C)	Not Cooperate(-C)
ACTOR 1	Cooperate(C)	5, 5	-10, 10
	Not Cooperate(-C)	10, -10	-5, -5

### 3.2. GGT ANALYSIS OF THE SOCIALLY EMBEDDED PD GAME

Role relationships, activated in particular interaction situations, i.e. with particular action opportunities and outcomes (or likely outcomes), imply particular game orders. Game actors' defined social relationships shape and influence their value judgments of actions and outcomes in the interaction situation. In general, a social relationship 'interacts' with the particular situational conditions. Thus, an interaction situation with *PD* features will not entail a 'dilemma' for actors with a solidary relationship, since they would tend to strongly prefer *CC* over other patterns. Nor would such a situation pose a dilemma for enemies, who would expect and appreciate non-cooperative patterns. However, for actors who are strangers or indifferent to one another, there is a dilemma.

Given the same interaction conditions (the *PD* situation) defined by a district attorney (Burns and Buckley, 1974), the particular game processes and outcomes will be a function of the role relationship among the actors involved. Here we focus on the following role relationships: (1) status or authority relationships; (2) solidary relationships as among friends or relatives; (3) anomic, or relations of indifference, among the actors; (4) competitive relationships as among rivals (that is, not simply situationally competitive); (5) relationships of hate and enmity. Each of these relationships implies certain core values and norms (see Table III), which the actors in performing their roles try to realize or satisfy in the given situation  $S_t$ . In making assessments of actions and outcomes, actors are assumed to do so largely from the perspective of their particular roles and role relationship, that is, the value complex of the role takes precedence over other values or value complexes exogenous to the relationship (there are limits to this prioritization, as discussed later).

The classical game was reformulated in terms of *GGT* concepts in the earlier article. Let the group  $I = \{1, 2\}$ . Their relationships are played out in game interaction situations with certain action opportunity structures (configuration of actions) as well as outcome structures. The action complex  $ACT(i, t, G)$  for each actor  $i$  would conform with the usual game theory characterization of the *PD* game.  $MODEL(i, t, G)$  for all  $i$  defines the situation in which each actor conceptualizes the relationship of their actions to concrete outcomes, over which they have or

develop (on the basis of their value complexes) preferences. For our purposes here, we assume a common model, although this assumption can be easily relaxed as shown in the previous subsection.

The socially embeddedness of a game is analyzed here by specifying value complexes and modalities of players that derive from their social relationship.

- (1) The value complexes of actors in hierarchical relationships consist of a norm of asymmetric interaction: the superior dominates and her subordinate shows deference and a readiness to comply with the wishes or demands of the superior. These patterns are typically limited or constrained by laws as well as by such norms as civility and *noblesse oblige*. The principle of distributive justice for a hierarchical relationship implies asymmetry: Right and proper outcomes entail greater gains for the dominant actor  $i$  than subordinate  $j$ .
- (2) The value complexes of actors in a solidary relationship consist of norms of cooperation and sharing of gains (and losses) as well as a symmetric principle of distributive justice. The appropriate decision modality is collective or joint decision-making – unless the actors are forced by circumstances to act separately, in which case, each would expect to take and to be taken into account.
- (3) The value complexes of rational egoists have been spelled out in the previous article (Burns and Gomolińska, 2000). The actor is oriented to outcomes affecting self. In contrast to either a solidary or enmity relationship, there are no values or norms orienting the actor to other(s). Evaluations or preferences are consistent and transitive. Norms constraining the available strategies might or might not be activated or applicable, for instance a norm of civility or prudence. The available strategies would be selected on the basis of the outcomes expected to be brought about. Such actors do not utilize a normative modality, focusing on the qualities of the actions available.
- (4) The value complexes of many variants of competitive relationships entail contradictory values – each actor is oriented to surpassing the other, e.g., maximizing the difference in gains (or the inverse in the case of losses) between self and other. According to the actors' individual values, the only acceptable outcome for each would be an asymmetric one where self gains more (or loses less) than others. In the case of 'civilized rivalry', there are norms, e.g., a norm of civility or prudence, constraining their strategies vis-à-vis one another.
- (5) The value complexes of actors in adversary relations contain value orientations to cause harm to one another. Again, as in the relationship of rivalry, the ends may be pursued according to institutionalized norms such as in 'dueling' or 'fair fights'. Of course, the power of each to cause harm to one another may motivate them to adhere to a principle of prudence, as in mutual deterrence between the former Soviet Union and the USA during the Cold War.

Having partially specified value complexes of actors on the basis of their social relationships, let us consider socially embedded game modalities. The modalities with which the actors operate may be consequentialist, normative, or both. This



*Table III.* Likely patterns of interaction and equilibria in a PD type situation as a function of established social relationships

TYPE OF SOCIAL RELATIONSHIP	CHARACTERISTIC VALUE COMPLEX AND RULES: META-EVALUATION AND DECISION RULES, SPECIFYING APPROPRIATE INTERACTIONS AND OUTCOMES (THE LATTER SATISFYING, FOR INSTANCE, PRINCIPLE(S) OF DISTRIBUTIVE JUSTICE)	APPLICATION TO THE PRISONERS' DILEMMA GAME
HIERARCHY	Norm of appropriate interaction is –CC, satisfying principle of 1's right to decide and 2's obligation to show deference. Right and proper outcomes are also asymmetric, with 1 receiving more than 2 (which satisfies the relation's principle of asymmetric distributive justice).	The asymmetric interaction (–CC) satisfies the norm of asymmetric interaction and the unequal payoff satisfies the principle of distributive justice. (–CC) is a normative equilibrium
SOLIDARY	The actors are governed by norms of cooperation and self-sacrifice and the value of solidarity (joint gains or sharing of gains). These satisfied by CC (the actors decide jointly unless separated, in which case try to take one another into account). Symmetric outcomes of CC are right and proper.	CC pattern to which the actors are predisposed provides an optimal outcome, also satisfying the relationships principle of distributive justice. (CC) is a normative equilibrium
INDIFFERENT (egoists)	Each follows rule of instrumental rationality (strategies derive value from what they accomplish for self). No interaction pattern or outcomes has collective normative force.	Rational calculation leads to the –C-C pattern of interaction, which is sub-optimal. This would be a situational equilibrium, but unsatisfactory. Rational actors would be predisposed to work out coordinating mechanisms in order to achieve the optimum outcome.
COMPETITIVE	Contradictory values. Each is oriented to surpassing the other (maximizing the difference in gains between self and other). Hence, (–CC) for actor 1 and (C-C) for 2 would be judged right and proper, respectively. The only acceptable outcome for each would be an asymmetric one where self gains more (or loses less) than other. But these expectations are contradictory.	The likely (and situational outcome) in all three games fail to satisfy the distributional rules which motivate them. Neither normative nor situational equilibrium obtains. Each would try to transform the game.
ADVERSARY	Each is oriented to harming the other. Hence, the action –C would be judged as right and proper, consistent with their mutual orientation. Outcomes when the other loses (for instance, C-C, –CC and –C-C) would satisfy the normative orientations of both.	The non-optimal outcome –C-C satisfies each of their values or goals vis-à-vis the other, namely to harm the other. This would be a consequentialist equilibrium.

differs, of course, from the classical case, in which a self-oriented consequentialist modality is assumed to operate universally. Normatively grounded relationships such as solidary or status relationships would typically exhibit *both* normative and consequentialist modalities, that is, the actors judge actions in terms of the qualities of interaction patterns they generate as well as the outcomes they bring about in the game context. For instance, actors in a solidary relationship would on the basis of a normative modality choose actions framed as ‘cooperative’, ‘compromising’, and ‘sacrificing’.<sup>4</sup> They might also apply a consequentialist modality in determining action, assessing and seeking those outcomes which, for instance, satisfy relevant mutual or common values.

### 3.3. NORMATIVE EQUILIBRIA

*GGT* conceptualizes normatively or institutionally based game equilibria. These are patterns or sets of consequences generated through actors realizing or anticipating the realization of their particular role based values and norms (collective patterns and consequences may be judged to realize or satisfy in themselves shared values). Such *normative equilibria* are a function not only of the particular relationship(s) among the actors but of the concrete situation  $S_t$  in which rule complexes are applied. These interaction patterns and outcomes have normative force. The participants know (or believe) that others accept or are committed to these equilibria – or to the rules that produce them. This makes for a particular ‘social reality’ that is predictable and provides space for planning and developing complex, individual and collective strategies. As we shall see, there may also be stable game patterns which are not normative equilibria in that they lack moral force or necessary legitimacy. Game players accept or, at least, tolerate them because they perceive them to be the best possible options under the circumstances. For instance, closed games may not permit in the game options or interaction possibilities the full realization or satisfaction of important values to which (some of the) participants are oriented. They merely go along with certain patterns pragmatically or conditionally – as long as they are constrained to play the given game. But such equilibria lack players’ commitments, and confidence or trust in them cannot be high or enduring over the long-run.<sup>5</sup>

Actors whose relationships are ‘rational’ or ‘competitive’ may operate only with an appropriate consequentialist modality, that is, instrumental rationality. For such actors, the strategies selected are those available in the situation, which are perceived to accomplish effective results. The ends justify whatever means or strategy is available. In practice, as we have pointed out earlier, actors’ available strategies may be constrained by norms. Table III specifies several different social relationships with their meta-evaluation and -decision rules. These rules define appropriate interaction and outcome patterns, the latter satisfying, for instance, a principle(s) of distributive justice if such is appropriate within the given relationship. Actors in a solidary relationship would utilize a normative modality to determine their actions

*vis-à-vis* one another, typically searching for and choosing actions of cooperation, compromise, and self-sacrifice. Actors in competitive relationships generate patterns of interaction or outcomes on the basis of an orientation toward maximizing difference. Actors in a relationship of enmity are mutually oriented to harming the other, that is, maximizing harm.

The meta-rules associated with these social relationships are *symmetric*. The extension of *GGT* description and analysis to asymmetric games is straightforward. Thus, in an administrative or bureaucratic hierarchy, a superior *i* as well as a subordinate *j* operate normatively within the frame of the asymmetric relationship. The superior *i* might be expected to utilize an instrumental or strategic modality to determine her own actions as well as *j*'s actions at the same time that she acts in accordance with the normative frame by communicating directives, evaluations, and carrying out sanctions *vis-à-vis j*. *j* is expected to act compliantly *vis-à-vis i*, obeying what *i* directs and accepting (at least publicly) *i*'s evaluations and sanctions. In general, through a specification of actors' social relationships, one can identify some of the underlying generative mechanisms and expected patterns of interaction. Several general patterns are identified in Table III.

The interaction patterns and outcomes in the relationships of status/domination and solidarity have normative force. They imply distinct normative equilibria in the games in the sense that only particular interaction patterns and outcomes satisfy or realize relevant shared values in  $VALUE(I, t, G)$  and norms in  $NORM(I, t, G)$  in  $S_t$ . For the group or collective  $I = \{1, 2\}$  involved in  $G(t)$ , a normative equilibrium for  $G(t)$  obtains if there is at least one pattern of interaction  $a_I = (a_1, a_2)$  and outcomes of  $a_I$ ,  $Out(a_I, I, t + n)$ , as assessed by the group  $I$  at some point  $t + n$ , such that norms in  $NORM(I, t, G)$  and values in  $VALUE(I, t, G)$ , active at  $t$ , are realized through  $a_I$  and  $Out(a_I, I, t + n)$ . In competitive, adversary, and similar social relationships, interaction patterns and outcomes cannot satisfy participants' norms and values, because the latter are not convergent or compatible. In the case of rivals, they obviously diverge. Moreover, the patterns lack normative force, i.e., they cannot be normative equilibria, since there are no shared values or norms specifying right and proper interaction patterns and outcomes as in the case of status and solidary relationships.

Actors with a solidary egalitarian relationship would in the context of a *PD* game experience no dilemma, in a wide range of situations. *CC* is a right and proper interaction, that is a normative equilibrium. This pattern is right and proper up to some limit, which can be analytically specified (see section 4; Burns and DeVille, 1999).<sup>6</sup> In other words, there are rough limits to their solidarity (solidarity would not in most instances be an absolute principle). We have also pointed out that in the case of actors who are enemies, the *PD* game poses no dilemma. Each can effectively punish the other, through non-cooperation,  $-C - C$ . This pattern is a situational equilibrium consistent with their relationship, but lacking, of course, normative force. In the case of actors with a status or authority relation, the asymmetric interaction (and outcome)  $-CC$  (or  $C - C$ ) is a normative equilibrium, that

is a normatively right and proper pattern. For actors in such a relationship, the *PD* does not pose a dilemma, other things being equal. Rational egoists, however, experience a genuine dilemma in the *PD* game. They are each predisposed to choose  $-C$ , but the resulting pattern  $-C - C$  is sub-optimal – which is problematic for purely instrumentally oriented actors. For this reason, the  $-C - C$  ‘equilibrium’ in the *PD* game would be an unstable state, according to *GGT*. The actors would, to the extent possible, try to transform the game into a more rational one, other things being equal (Burns et al., 1998). For instance, through direct negotiation and norm formation – or other ways in which game/relationship configurations may be restructured and transformed – they may guarantee the mutual beneficial interaction *CC* (success at this would contribute to building further trust and even a normative basis of solidary relationships).<sup>7</sup>

In our consideration of the prisoners’ dilemma game from the *GGT* perspective, we have indicated how the social relational context of a game implies the application of particular norms and values, the generation of distinct value judgments and preferences as well as interaction patterns and outcomes. This approach also has implications for conceptualizing and determining game equilibria, a matter which is elaborated in the following section.

#### 4. Scope of Interaction Patterns and Equilibria in Complex Value and Relational Fields

Human agents often find themselves torn between doing what is right or proper vis-à-vis others and doing what would provide them substantial personal gain (possibly through deception or cheating of the other). In a multi-value world, dilemmas and predicaments are commonplace (Buckley et al., 1974; Burns, 1994).<sup>8</sup> Constraints on particular game relevant values as well as on the range of strategies in a game arise from extraneous values and role relationships to which the actor is oriented or feels subject in the situation, for instance in the context of a network of social relationships and embeddedness.<sup>9</sup>

Exogenous values enter in, and compete with and set bounds on, the evaluations and commitments to actions and outcomes of a particular relationship or institutional arrangement. These bounds relate also to actors’ experiences of value dilemmas and predicaments in situations where the bounds are tested. The scope of appropriateness (and activation) of a given value or value relevant to a game complex  $G(t)$  depends on meta-rules or meta-values defining limits and interrelationships among diverse values.<sup>10</sup>

What are the limits associated with game patterns and equilibria based on actors’ attempts to realize a value or value complex, perform a role, and comply with the ‘rules of the game’ which apply necessarily. One major source of such limits are exogenous values, commitments, and engagements that under some conditions enter into the game context and impose constraints and open up opportunities. Thus, loyalties or commitments to other social relationships, roles, and values

(which may be the basis of one's own personal identity, ambitions and needs) make for constraints on the pursuit or realization of an institutionally specific role with its particular value complex. Such extra-relational (or extra-role) considerations make not only for bounds (or scope of validity) but for dilemmas and predicaments as well as disequilibria.<sup>11</sup>

In general, the values, commitments, and loyalties in any given game context are generally bounded, and the bounds are situationally specific. Even an established role relationship (with more or less predictable equilibrium conditions) may be impinged on by extraneous rule complexes (relationships, norms, values), *setting limits and transforming value complexes*.

The following analysis focuses on value complexes but is readily extended to consideration of actors' models, action repertoires, and modalities, that is, the major components of roles and role relationships. For instance, the limits of a routine or programmed interaction would be defined by the scope of rule application. There are situations or classes of situations where particular rules or rule complexes simply cannot be applied. Such limits may arise not only because of material conditions. Ambiguities or contradictions in rule complexes may also be a factor. Conditions of usual applicability would be disturbed by an extraneous norm or rule complex evoking ambiguity or incompatibility in the course of routine execution of actions. Or, a usual normative equilibrium would be disequilibrated by an extraneous relationship, norm, or value which is activated and competes or interferes with those of the defined (relevant) role relationship.

Earlier, we identified and analyzed ideal type situations where actors try to construct or enact patterns and accomplish outcomes which are prescribed or implied by their role relationship. For instance, actors in a solidary relationship are disposed to find an interaction pattern which is compatible with the *symmetric* interaction norm of the relation and the equity principle of distributive justice. Other values, norms, loyalties, and relationships may impinge on and set constraints on the acceptable patterns and social equilibria. Game interaction patterns and outcomes would be expected not only to satisfy the relevant norms and values defined for the game in the context of their relationship but also satisfy impinging exogenous norms and values. As earlier,  $VALUE(I, t)$  and  $NORM(I, t)$  denote the collective actor  $I$ 's value complex and norm complex in  $S_t$ , while  $VALUE(I, t, G) \subseteq_g VALUE(I, t)$  and  $NORM(I, t, G) \subseteq_g NORM(I, t)$  denote  $I$ 's value complex and norm complex in  $S_t$  relevant for the game  $G(t)$ , respectively. Assume that an interaction pattern  $a_I = (a_1, \dots, a_m)$  and the outcomes  $Out(a_I, I, t + n)$  of  $a_I$ , as assessed by  $I$  at  $t + n$ , satisfy relevant values in  $VALUE(I, t, G)$  and norms in  $NORM(I, t, G)$  internal to the relationship, that is, a normative equilibrium obtains. However, the interaction pattern and outcomes may be expected, in addition, to satisfy an exogenous value complex  $C \subseteq_g VALUE(I, t)$  defining limits (for instance, a maximum price or a minimum quality) for the collective  $I$ . In other words, there

is a maximal value  $v_{\max}(I, t)$  derived from  $C$  such that for each possible outcome  $x$  of the interaction  $a_I$ ,

$$J_{\text{val}}(I, t)(x) \leq v_{\max}(I, t). \quad (13)$$

Typically, there are exogenously determined constraints set by law, community norms, other conceptions about what is right and acceptable. Limits may refer to, for example, quality of product or environment risk. The exogenous values and norms, such as community norms or laws, may define limits for collective activities and their outcomes. *When these limits exceed or contradict those defined internal to the relationship, there can be no normatively satisfactory interaction space.*

For the moment, consider the problem from the perspective of a single actor in a game  $G(t)$  in situation  $S_t$ . Actor  $i \in I$  might realize  $VALUE(i, t, G) \subseteq_g VALUE(i, t)$  and, in particular,  $NORM(i, t, G) \subseteq_g NORM(i, t)$  through some action(s)  $a_i$ . In the same situation  $S_t$ , however, the actor  $i$  may feel obligated to realize another value complex  $C \subseteq_g VALUE(i, t)$  or another norm complex  $D \subseteq_g NORM(i, t)$  through some different action(s)  $a_i^*$ . However, satisfying these external values  $C$  and norms  $D$  not only imposes further constraints, but may entail demands incompatible with the actor  $i$ 's situational role, values, and norms in  $G(t)$  (and the action(s)  $a_i$ ).

**Example 4.1** In the case of actors who are rivals or hostile to one another in a *PD* game, there are typically limits to their commitment 'to outdo the other' in the context of their relationship of rivalry, or, in the context of a relationship of enmity, "to harm the other", respectively. The outcome is, of course, sub-optimal viewed from outside the relationship. Actors might experience a dilemma between acting in a manner consistent with their relationship (causing maximum harm to one another) or "cooperating" and avoiding the risk of substantial mutual losses. The strength of the desire to survive or to avoid 'excessive' loss or suffering would be decisive here, but these are assessments exogenous to the logic of their relationship. Such considerations would lead to mutual deterrence. The deterrence may, of course, breakdown under some conditions – where one or the other agent goes over the limit, either through accident, miscalculation, or brinkmanship, and the other responds in kind, unleashing a process which is difficult to curb, once underway, because of powerful tendencies toward escalation.

**Example 4.2** In the case of solidarity actors playing, for instance, in a *PD* game, their relational norm would imply cooperation (*CC*). Each actor, however, has certain rough limits with respect to the 'sacrifices' that she is prepared to make. For instance, the actor  $i$  has a maximum value ('price')  $v_{\max}(i, t)$  above which she is not willing to go for the sake of the relationship. Actor  $j$  may accept this limitation, acknowledging such a norm by not pressuring  $i$  beyond this. Thus,  $v_{\max}(i, t)$  sets a limit for equilibrium interactions. Given their social relationships and particular norms, there are more or less rough situational limits to – that is

the scope of – patterns of interaction and outcomes as well as normative equilibria. The greater the value of a social relationship to the participants, the higher the limit or maximum, and the higher the level of cooperation, self-sacrifice and resistance to disloyalty or cheating. Hence, if  $i$  and  $j$  (as well as possibly other persons) consider their relationship as a ‘close friendship’, this implies a readiness to make more substantial sacrifices than in the case of a relationship of mere ‘acquaintances’. Participants would be predisposed to make such sacrifices up to the value of the relationship, the *reciprocity value of the relationship* (Burns, 1990; Burns et al., 1998). Failure to live up to these implicit mutual obligations would tend to undermine the relationship.

As the value gains associated with unilateral defection in the *PD* situation ‘compete with’ or approach ‘equivalence’ with the reciprocity value of the solidary relationship, the likelihood increases of ‘defection’, that is, one or another form of betrayal. This deviance may even be anticipated or recognized as a potentiality by the participants themselves. On the one hand, neither participant could be expected – or trusted – to sacrifice an opportunity much greater in value than that of their relationship, *unless there was a mutual desire or commitment to establish or demonstrate increased commitment to – and value of – the relationship*. On the other hand, resisting the temptation of betrayal or defection strengthens or reinforces the reciprocity value of the relationship, while demonstrations or signs of betrayal erode the value and stability of the relationship.

Meta-rules ultimately define maximum value, or the scope of a commitment to a value (in relation to other values and commitments). For instance in the preceding example, the reciprocity value level is a maximum value of exchange in the relationship. The degree of commitment to help and sacrifice to another is roughly equivalent to the value the actors assign to their social relationship.<sup>12</sup> This value may shift as the actors increase their commitment to and trust of one another, in that in the course of their interactions they demonstrate their willingness and ability to do more substantial favors, or to make more significant sacrifices, for one another. The value and stability of the relationship would be reduced or destroyed by betrayal or erratic, unpredictable behavior.

In general, actors are more or less predictable and understandable to one another through shared characterization and knowledge of their relationship, in particular the knowledge of the meta-rules defining limits and the scope of commitment to a particular value complex. Thus, *actors can take into account in their judgments and calculations the scope of what they can request or expect and what can be requested or expected of them*.<sup>13</sup>

Scope, as suggested earlier, may be narrow or wide. In the case that an actor’s meta-rules define exogenous, potentially competing values as low priority, or outside all consideration, then a form of absolute commitment operates. She does not experience (or can readily resolve) dilemmas and conflicts, for instance between the values and norms of her role in  $G(t)$  and other loyalties and relationships,

whether these concern family or friendship loyalties and commitments or professional career orientations or adherence to the law. For instance, an actor may pursue wealth or power without concern about the strategies or means used as in the case of agents with absolutist value orientations (this type of commitment is not alien to our economic and political culture). John Hall (Hall, 2000) has pointed out that the early Karl von Clausewitz (1780–1831), drawing on observations of the success of Napoleon, formulated the principle that the essence of state behavior is that of pursuing its ends without limit. After witnessing the collapse of Napoleon's ambitions, he came to distrust the unlimited quest for power and to propose a bounded or prudential orientation, thus imposing constraints on the pursuit of ends and also the construction of means, that is, to construct a more pluralistic and balanced value framework.

Such frameworks pose, however, their own problems, as suggested earlier. A more pluralist or encompassing value framework in a game situation – including openness to exogenous values, norms, and social relationships – increase the likelihood that actors experience dilemmas and predicaments in contrast to a more absolutist value regime. Decision time will be slow or blocked in the absence of meta-rules with which to resolve value conflicts arising in an interaction situation  $S_t$ . Multiple values may ideally converge (or make up a convex relationship), that is, they do not basically interfere with or contradict one another in judgment and decision processes. However, destructive interference or negative interdependence (that is, a concave relationship) results in no well-defined pattern of choice and highly uncertain behavioral implications: (1) inconsistent action: one time value complex  $C_k$  is applied, next  $C_n$ ; (2) indecision and immobilization; (3) learning and development processes which ultimately result either in a consistent value complex (possibly with transcendent values) or in one with meta-rules assigning priorities. In the case of decision paralysis, no normative (or instrumental) equilibrium would, of course, be possible. In the case of inconsistency, there would be shifting equilibria, one equilibrium at time  $t$ , another at  $t + 1$ .

An actor may establish a meta-rule order that balances, in a certain sense, the extremes of absolutism and disordered pluralism. This might be accomplished through, for instance, a lexicographic value order. Here the values and norms in  $VALUE(i, t, G)$  are realized or satisfied first, then those connected with other roles and their value orientations may be considered next. **The actor  $i$ 's operative value complex  $VALUE_o(i, t) \subseteq_g VALUE(i, t)$  in  $S_t$  is transformed.** It is no longer  $VALUE(i, t, G)$  but also includes other value complexes, say  $C_0, \dots, C_k$  as subcomplexes:

$$VALUE_o(i, t)[VALUE(i, t, G), C_0, \dots, C_k, D] \quad (14)$$

**where  $D$  is a rule complex containing relevant meta-rules.** In case there are inconsistencies or conflicts, the meta-rules in  $D$  resolve these in favor of values in  $VALUE(i, t, G)$ .



Earlier analyses apply in a straightforward way. Assume that the actors are oriented to realizing the more complicated value complexes, encompassing additional values and norms which must be satisfied. Success in finding interaction patterns or outcomes satisfying  $VALUE_o(i, t)$ , for each  $i \in I$ , implies, of course, normative equilibrium. However, the interaction consequences – and normative equilibria – are likely to differ from those of the simpler or core value complex  $VALUE(i, t, G)$ . Only in the case that there are no new consequences of the exogenous values or norms in  $C_0, \dots, C_k$  would the interaction patterns and outcome equilibria be the same as in the case of the isolated or undisturbed game relationship. Typically, an operative value complex  $VALUE_o(i, t)$  that encompasses additional values makes judgment and action determination – and the accomplishment of social equilibria – not only more complex but more uncertain and difficult to accomplish (and with increased transaction costs). Indeed, they may severely compromise the values in  $VALUE(i, t, G)$ , which ideally should make up the core of the operative value complex in  $G(t)$ .

In general, there is a nexus of relationships and values which may be active and applied in  $S_t$ , not only those underlying the expected relevant roles and norms in  $G(t)$ . Often, exogenous institutional arrangements, relationships, and roles impinging on a given game  $G(t)$ , block or undermine patterns or states, which would otherwise be game equilibria. *Of course, if such competing or conflicting values fail to materialize (or are effectively resolved through meta-rules), then there are no dilemmas, predicaments, or obvious constraints.*

In some situations, there may be clearcut meta-rules ordering the value complex. That is, certain meta-rules in an actor's value complex define *the ordering of values*, the relative commitment to them, and their scope.<sup>14</sup> These rules set certain maxima, or bounds to how far one may or ought to go in trying to realize a particular value or value subcomplex in a *complex value field*. The scope can be virtually 'without limit', as in the case of an absolute or uncompromising commitment; in this case, other values and considerations are ignored or very much downplayed – the particular value or goal would be pursued 'at all costs'. This end would, in such a perspective, justify all means. Meta-rules in the case of more pluralist, elaborate value complexes designate or imply equivalences and orderings.<sup>15</sup> Any culture has meta-rules categorizing and assigning relative values to things, deeds, and persons, and also designating or implying some equivalences. In a fully monetarized society, market price serves as one major basis of value judgment and determination of orderings and equivalences. But, as suggested earlier, the scope of relevance or activation of a value complex is never precisely or fully specified. In part, value orderings are typically neither unambiguous nor consistent. Actors may have no immediate response or resolution of conflicting values (situational dilemmas or conflicts and predicaments). They must engage in reflective and transformative processes, a subject we address elsewhere (Burns and Engdahl, 1998; Burns et al., 1998).

## 5. Conclusions

The point of departure of *GGT*, while critical of some features of classical game theory, has explored fruitful ways to extend and develop it (and, in general, rational choice theory).<sup>16</sup> In *GGT* there are several parallels as well as extensions of concepts of rational choice and classical game theory. The concept of value complex, *VALUE*, has parallels to, but also encompasses and extends, the concept of a utility function.<sup>17</sup> Utility is a unidimensional value satisfying artificial rules of rationality such as consistency and complete ordering of preferences. The value complex concept makes no such claim of universal consistency and well-orderedness in human judgments. It is the basis on which actors make evaluative judgments and generate preferences, although it may be characterized by inconsistencies, fuzziness, and gaps. Value complexes are closely associated with particular roles, social relationships, and institutional arrangements, the point of departure of sociological explanation of context dependent preferences. A further contribution of *GGT* is its formulation of *MODEL*, belief structures and cognitive frames that provide a particular perspective on, and a basis for understanding, the perceived reality of the situation  $S_i$  in the context of defined social relationships (Burns et al., 1998; see also Boudon, 1996, 1998). In classical game theory, all game players are assumed to have the same representation of the situation, and, moreover, this representation is assumed to be identical to that of the game theorist. *MODEL*, corresponding in a certain sense to the rational choice notion of ‘information’ (perfect or less than perfect), conceptualizes an actor’s bounded, possibly distorted or even **false** beliefs and cognitive frames (as in the bargaining game of section 2). This conception offers a point of departure for describing and explaining the diversity of models and belief structures with which actors operate and adapt in the course of their interactions. Modality, a basic mechanism for determining action, is a third critical dimension on which the two theoretical approaches have parallels but *GGT* extends the game theory approach. Game theory – and rational choice theory more generally – assume that actors operate with a common universal modality, namely that of instrumental rationality (for instance, maximizing expected gain or utility). In *GGT*, a variety of socially embedded judgment rules and algorithms replace a given fixed algorithm such as maximization (the latter viewed as a highly context-dependent special case (Buckley et al., 1974; Burns and Meeker, 1977), fully representable and applicable within *GGT*).<sup>18</sup>

In this and the previous article (Burns and Gomolińska, 2000), *GGT* formulated the concept of multi-modal social action, which generalizes a number of other approaches. For instance, (1) the modality of instrumental rationality corresponds to rational choice (and game theory approaches) (Coleman, 1990; Hardin, 1982; Hechter, 1987; Olson, 1968; Von Neumann and Morgenstern, 1972); (2) The routine or habitual modality corresponds to notions such as ‘standard operating procedures’, ‘programs’, or ‘habitus’ (concerning the latter, see Bourdieu, 1977); (3) The normative modality corresponds to approaches such as Parsons (1937),

Harre (1979), Harre and Secord (1972), and Winch (1958); (4) Role conceptions of action may combine modalities such as instrumental and normative (Goffman, 1959, 1961; Hollis, 1987); (5) Additional modalities of action such as 'play' and 'communicative/dramaturgy', can be taken into account with the *GGT* approach (Burns et al., 1998). Modalities for determining action encompass processes of 'choice' or 'decision' but also account for determination processes such as habitual action devoid of deliberation and choice. Choice and decision, while major social science concepts, are far too narrow and constraining if we are to understand the diversity and complexity of action determination processes.

Finally, the *GGT* conceptions of action alternative and strategy differ from those of game theory. The action complex, *ACT*, includes 'action alternatives' in a decision or game situation. But it also includes routines, programs, and habits with which actors may respond automatically (i.e., without deliberation or choice) to particular problems or conditions in a situation  $S_t$ . It also includes operations that relate to stopping (or pausing) in a program or routine as well as acts making up a reflexive mode with respect to rule complexes (Burns and Engdahl, 1998). Of particular importance is that *ACT* in the *GGT* conceptualization may be subject to attempts by the actors themselves to manipulate and control. In other words, *ACT* may become an object actors try to constrain or transform, that is a policy or control variable. Obviously, particular social, institutional and other factors constrain the complex of options, limiting the extent it can be manipulated or transformed by the participants. The useful distinction between open and closed games derives from this conceptualization of action repertoires and the capacity of actors to construct and transform them.

Our generalization of classical game theory implies that there are *many game theories or models reflecting or referring to different social relationships and corresponding rationalities or action logics*. Classical game theory is, therefore, a model limited in its scope and applicable to a particular type of social relationship: namely that between unrelated or anomic agents acting and interacting in accordance with rationality rules and modalities. The actors lack sentiments – either for or against – one another. They are purely neutral and egoistic in their relationship. Their games are closed ones. They may not change the rules such as the number and qualities of participants, the specific action alternatives and outcomes, the modality of action, or the particular social relationships obtaining between them. The creative aspect of action, as exhibited in open games, has been recognized by Tsebelis (1990), but he recognizes that one cannot systematically address the problem within the classical framework.

The rational choice approach, including game theory, has been constructed on a particular conception of human action and interaction. In their stress on people as rational egoists in a struggle for survival (which captures to a certain extent important features of social behavior) they ignore, among other things, the powerful human sentiments of sociability and self-sacrifice, based on normative relationships. Their approach to human action has been exploited by some to normalize,

and even justify, rapacious and immoral behavior in business, politics, and international relations. In the final analysis, they ignore at best, degrade at worst, the moral agency of human beings, and the deep normative underpinnings of much social behavior (Burns, 1994).

The formulation of more integrative approaches to the conceptualization and analysis of human action and interaction is a major challenge to contemporary social science, particularly in the face of its profound fragmentation. A common, foundational language for the social sciences would contribute to overcoming the “babble of two hundred voices” (Joseph Conrad) that characterizes contemporary social science as well as the humanities and moral philosophy. The babble not only blocks communication and collaborative work among academic communities but impedes serious, systematic treatment of many of the formidable problems confronting the contemporary world. Concrete practical problems challenging human agents rarely fit neatly into academic divisions.

The challenge of interdisciplinary communication and collaboration would be no more than academic, if there was not a growing demand in modern democratic societies for systematic knowledge about how the economy interacts with politics, or about how social institutions such as the family, community, and state agencies are affected by technological, economic and environmental developments. Increasingly complex or entirely new interdependencies arise which fall outside the domain of knowledge or competence of any single social science or academic discipline. There is a growing need for a common theoretical language with which to describe, analyze, and understand human interaction and to facilitate communication and collaboration among scientists from different disciplines. The theory of socially embedded games is a promising candidate in this respect.

## Notes

1. The estimates or hypotheses that the actors formulate may be rough, incomplete, or even false; they may be experienced as highly certain, uncertain, or with some degree of uncertainty.
2. As discussed in Rasmussen (1989: 231) under a number of restrictive assumptions not considered here, this outcome furnishes the unique Nash equilibrium solution to this ‘bargaining game’. That is, the unique value which simultaneously maximizes the ‘expected utility’ of both participants and provides equal gains to both.
3. The ‘bargaining’ situation is essentially an assurance game, one where the ‘favorable’ outcome must be identified or specified through some type of ‘negotiation’ process, in particular, engagement in normative discourse about an appropriate or ‘fair’ settlement. In this negotiation actors who share a friendship relationship would be inclined to apply either an equity norm or the friendship norm of sacrifice-for-the-other. In the former case, they might, as noted above, ‘split the difference’ between  $x_{\min}$  and  $x_{\max}$ . In the case each wants to enact the friendship norm by making a sacrifice for the other, they would tend to pull in opposite directions, Buyer trying to pay up to  $x_{\max}$  for  $X$  and Seller trying to lower it to  $x_{\min}$  (that is, a ‘conflict’ between friends in the name of friendship).
4. Of course, a solidary relationship varies in the degree of commitment to it (the level of mutual responsibility, self-sacrifice, etc.). Typically, actors will have some discretion in defining the level of reciprocity as long as the appropriate norm of reciprocity is followed.

5. An outcome that is not Pareto optimal is one where the actors, if they cooperate in restructuring their pattern – or underlying rules – can improve the payoffs for some (or all) of them without reducing the payoffs for others, namely through movement to the *CC* interaction. Pareto optimal points are stable against universal coalitions, because it is not possible to deviate in such points without hurting some players. Thus, this acts as a constraint on collective shifts (Scharpf, 1997; Tsebelis, 1990). The *PD* game has an equilibrium for rational egoists, namely  $-C - C$ , which is not Pareto optimal.
6. This prediction contrasts to the results of classical game theory, which indicates the non-cooperative outcome as an equilibrium. *GGT* stresses the motivation of actors to realize their goals or values, experience frustration when they fail to do so. There is nothing *inherent* in the social relationship between rational egoists proscribing or inhibiting them from effectively exploiting opportunities to communicate and reach agreements in the pursuit of mutual gain, provided, of course, that institutional rules or ecological conditions permit. Hostile agents, on the other hand, have difficulties inherent in the relationship in using opportunities for communication, making and adhering to agreements, and pursuing opportunities for mutual gain.
7. The one-shot *PD* game played by two purely self-interested actors, each operating with an instrumental modality, would result in the selection of the mutual defect outcome, that is  $-C - C$ . This is a sub-optimal outcome (but a Nash equilibrium). In the case the interaction is iterated (or the actors are able to bargain beforehand and make their actions contingent or correlated), the likelihood of cooperation (the optimal result) in the *PD* game increases, particularly when the payoffs for the cooperative alternative increase. The likelihood decreases when the payoffs for non-cooperation increase. This is all fairly straightforward from an instrumental rational perspective. Tsebelis (1990) stresses that game iteration allows for the development of contingency or correlated or contingent strategies (that is, transformation of the repertoire of actions in  $ACT(I, t, G)$ ). For instance, an actor can threaten an opponent such that if she deviates from a cooperative pattern (which they may agree on), she will suffer the maximum possible punishment. Such a proposition is an effective threat only if the opponent will lose more in subsequent interaction than she stands to gain by the deviation in one immediate interaction. Thus, if the number of subsequent rounds is ‘sufficiently large’, the promise of punishment is an effective threat (Tsebelis, 1990:77).

The ‘folk theorem’ in the case of iterated games suggests that options are transformed, in that action complexes include possibilities to reward or punish past behavior of others. If this sanctioning capacity is employed in tit-for-tat strategies, rewarding cooperation and punishing non-cooperation or defection, then rational self-interested actors are able to achieve stable cooperation in the iterated 2-person *PD* game. More generally, the ‘folk theorem’ states that in all indefinitely iterated non-cooperative games, any outcome that is better for all players than the single-shot equilibrium may become an equilibrium solution – given a sufficiently low rate of discounting the future (Scharpf, 1997: 76; among others). In general, iterated games make for experiential conditions that allow for *the formation of specific social relationships (organized and regulated by a common rule complex), with particular decision rules (coordination or cooperation, tacit or not) as well as distributive rules*. This is not only because the iterated interactions allow for “tacit communication” (Hardin, 1982) – in itself an important aspect of human interaction – but because it enables rule formation as a basis for eventual normatively governed interactions, which is the *sine qua non* of institutionalized social relationships and eventual normative equilibria (Burns and Flam, 1987; see also Alker, 1996).

8. Each actor brings her own experience (including role set) to any particular role, which provides potentialities or opportunities for rule complex ‘drift’ or rule diffusion and experiential flows from one role to another.

9. Games are interconnected so that outcomes, actors, strategies of one game influence those of another, thus affecting the game patterning and outcomes (Baumgartner et al., 1986; Burns et al., 1988; Tsebelis, 1990).
10. The *GGT* approach to action and interaction enables us to understand and explain human inconsistency and predicament, arising because of a plurality of values and contradictory social arrangements (that are historical products of many *ad hoc* changes and negotiations). *Consistency in itself may be of no great value*, contrary to a basic axiom of rationality. A rule complex satisfying conditions of rationality such as consistency can be inapplicable in a class of relevant situations (in *GGT* this consistency is conceptualized as derived consistency (Burns et al., 1998; Burns and Gomolińska, 2000)). Or, although the consistent complex can be applied in  $S_t$ , it may be ineffective in realizing the values which it is expected to realize – as in the case of rational choice agents in the *PD* game.
11. For instance, businessmen who are ethically oriented may be confronted with such dilemmas and predicaments. To be a good businessman may require breaking religious rules or family role demands. Besides the rules which indicate what is the morally right thing to do, there are other rules related to success in the market such as effectivity rules which indicate what is practical, advantageous, or necessary (in some instances, possibly for the sake even of the moral rules that are otherwise compromised). Actors experience predicaments in these situations. These give rise not only to rationalizations, particular discourses, and rituals which minimize the sense of contradiction (Machado and Burns, 1998) but also to reflection and the development of new strategies and relationships to deal with such problems (Burns and Engdahl, 1998).
12. In the case of more or less similar social actors without a division of labor or authority between them (as indicated by the resources they control and their action capabilities),  $i$  and  $j$ 's reciprocating goods and services would be similar, or, indeed, the very same types of goods and services. They would simply be produced or provided at different times and in different settings. In the case where  $i$  and  $j$  have substantially different resources and action capabilities, the equivalence function would concern qualitatively different goods and services, for instance,  $i$  provides various economic goods and services and  $j$  reciprocates with political goods and services. Reciprocity or balanced exchange is assured by socially or culturally defined equivalence relations (Burns, 1990). Relationships with potential equivalences can be distinguished from imbalanced relationships, that is one where actor  $j$  cannot provide any good or service equivalent in value, even approximately, to what  $i$  is capable of providing, that is,  $J_{\text{val}}(i, t)(b) \ll J_{\text{val}}(j, t)(a)$  for any  $a \in_g \text{ACT}(i, t)$  and  $b \in_g \text{ACT}(j, t)$  in a considered situation  $S_t$ . Such imbalances are expected or natural in the case of relationships of responsibility and caring as in parent/child, teacher/student, medical professional/patient relations where asymmetry is expected.
13. Of course, there often is a dynamics to these relationships, as actors intentionally try to extend or to test the limits. For instance, (1) persons involved in – or seeking to establish – a social relationship will demonstrate, and indeed seek to demonstrate, the value of the relationship by making sacrifices, resisting temptations, and showing that they are trustworthy, reliable, and responsible participants, at least to the degree implied by the value they place on the relationship. (2) Given a solidary relationship with an established reciprocity value, one or both actors may decide to try to increase the level or quality of services or goods provided in order to raise the value of the relationship, and the commitment of the other actor (such value enhancement is also an emergent and natural result of providing higher valued goods and services to one another, unless these are bracketed in one way or another). They invest in the relationship to strengthen one another's mutual commitments and obligations to the relationship. If successful, the value level or maximum may be increased, and a new class of normative equilibria attained, subject, of course, to the constraints of other social relationships and values, as argued earlier. One might claim that configurations involving solidary relationships in interaction situations lacking normative equilibria are transient and that the actors are likely to engage successfully in search processes, possibly ending in the discovery or construction of one or more normative

equilibria. However, such engagement in search rests on a meta-belief among the participants (or third parties such as mediators) that the process will probably succeed. The construction or reconstruction of normative equilibria depends then on a belief – action complex, e.g., that one can reach a normatively grounded, negotiated equilibrium that will satisfy the value and norm complexes of the actors involved. Stable, situational equilibria rest also on a belief that the situation cannot be changed or, if changed, will result in even worse negative states that may be stable in themselves. Such beliefs contribute to the erosion of the social relationship which fails to be realized and reproduced in the situation. In general, value commitments (in value complexes) as well as belief structures (in models) play a major role in stabilizing institutionalized relationships. They do this in two ways: (1) They contribute to defining what are right and proper normative equilibria. (2) They contribute to maintaining the social foundations for a framework within which particular normative equilibria are generated. That is, there is a *belief – commitment complex*, typically associated with social identity and status, which may be in general robust (and resistant to disruption). Under some conditions, it is vulnerable to erosion. Consequently, previously expected normative equilibria are abandoned; established constraints in the interaction situation are no more or are weak, and interactions become unpredictable. For instance, once people lose confidence in a banking system, or its currency, they tend to scramble to take their wealth out of the system, or to get rid of doubtful currency, thus contributing to making the system less attractive, more risky, and potentially more unstable. A vicious circle of decline and ultimate collapse may be set in motion. Such examples point up the key role that loss of belief or confidence in, and commitment to, a given institutional order play in its stabilization (or destabilization).

14. The meta-rule (or meta-rule complex) may have a non-instrumental basis of acceptance or commitment (normative or symbolic).
15. A meta-rule operates as a moral imperative. For instance, if a person is in a role of responsibility (presumed responsibility) and can *attain a good state of affairs* with respect to one value or value subcomplex by sacrificing things defined to be of *lesser* significance, then one ought to be so oriented: she should do it. Such a meta-rule may refer also to things of *comparable* value, indicating how to balance these out with respect to one another (as in a reciprocity relationship). Similarly, if one is in a role of responsibility (presumed responsibility) and *can prevent a bad state of affairs* by sacrificing things defined to be of less significance, then one ought to be so oriented. The meta-rule may refer to things of comparable significance, indicating how to balance these out with respect to the value or value subcomplex in question.
16. *GGT* diverges in another respect from the initial thrust of Von Neumann and Morgenstern's work: It does not theorize about parlor games and contests, although the sociological foundations of *GGT* should allow it to be extended to such games and contests as special types of human interaction situations, with particular definitions of the situation and social rule complexes applying.
17. The utility function concept is far too restrictive. Value conceptualization refers not only to non-material or non-economic interests including highly symbolic entities but effectively accounts for the pluralism of values (at times incommensurable or contradictory) applying in human action and interaction.
18. There have been a number of developments, of course, to overcome the limitations of simple maximization by introducing the maxmin rule or satisfying rules, or multi-objective decision-making.

## References

- Alker, H. R., Jr. (1996). *Rediscoveries and Reformulations: Humanistic Methodologies for International Studies*, Cambridge: Cambridge University Press.
- Baumgartner, T., Buckley, W. & Burns, T.R. (1975). Relational control: the human structuring of cooperation and conflict, *J. of Conflict Resolution* 19: 417–440.
- Baumgartner, T., Burns, T. R. & DeVille, P. (1977). Conflict resolution and conflict development: the structuring and restructuring of games. In: Kriesberg, L. (ed.), *Research in Social Movements, Conflicts, and Change*, Greenwich, Conn.: JAI Press.
- Boudon, R. (1996). The cognitivist model: a generalized ‘rational-choice model’, *Rationality and Society* 8(2): 123–150.
- Boudon, R. (1998). Limitations of rational choice theory, *American J. of Sociology* 104(3): 817–828.
- Bourdieu, P. (1977). *Outline of a Theory of Practice*, Cambridge: Cambridge University Press.
- Buckley, W., Burns, T. R. & Meeker, D. (1974). Structural resolutions of collective action problems, *Behavioral Science* 19: 277–297.
- Burns, T. R. (1990). Models of social and market exchange: toward a sociological theory of games and human interaction. In: C. Calhoun, M. W. Meyer & W. R. Scott (eds), *Structures of Power and Constraint: Essays in Honor of Peter M. Blau*, New York: Cambridge University Press.
- Burns, T. R. (1994). Two conceptions of human agency: rational choice theory and the social theory of action. In: P. Sztopka (ed.), *Human Agency and the Reorientation of Social Theory*, Amsterdam: Gordon and Breach.
- Burns, T. R., Baumgartner, T. & DeVille, P. (1985). *Man, Decisions, Society*, London/New York: Gordon and Breach.
- Burns, T. R. & Buckley, W. (1974). The prisoners’ dilemma game as a system of social domination, *J. of Peace Research* 11: 221–228.
- Burns, T. R. & DeVille, P. (1999). On social equilibria. Paper presented at the International Economic Association World Congress, Buenos Aires, Argentina, August, 1999.
- Burns, T. R. & Engdahl, E. (1998). The social construction of consciousness: collective consciousness and its socio-cultural foundations, Individual selves, self-awareness, and reflectivity, Parts I and II, *J. of Consciousness Studies* 5(1–2): 67–85.
- Burns, T. R. & Flam, H. (1987). *The Shaping of Social Organization: Social Rule System Theory with Applications*, London: Sage Publications (reprinted 1990).
- Burns, T. R. & Gomolińska, A. (1998). Modeling social game systems by rule complexes. In: L. Polkowski & A. Skowron (eds.), *Rough Sets and Current Trends in Computing*, Berlin/Heidelberg: Springer-Verlag.
- Burns, T. R. & Gomolińska, A. (2000). The theory of socially embedded games: the mathematics of social relationships, rule complexes, and action modalities, *Quality and Quantity* 34: 379–406.
- Burns, T. R., Gomolińska, A., Meeker, D., & DeVille, P. (1998). *The General Theory of Games: Rule Complexes, Action Modalities, and Transformations*, Uppsala Theory Circle Report: Uppsala, Sweden.
- Burns, T. R. & Meeker, D. (1974). Structural properties and resolutions of the prisoners’ dilemma game. In: A. Rapoport (ed.), *Game Theory as a Theory of Conflict Resolution*, Dordrecht, Holland: Reidel.
- Burns, T. R. & Meeker, D. (1975). A multi-level, structural model of social behavior, *Quality and Quantity* 9: 51–89.
- Burns, T. R. & Meeker, D. (1977). Conflict and structure in multi-level, multiple objective decision-making systems. In: C. A. Hooker (ed.), *Foundations and Applications of Decision Theory*, Dordrecht, Holland: Reidel.
- Coleman, J. S. (1990). *Foundations of Social Theory*, Cambridge, MA: Belknap Press.
- Goffman, E. (1959). *Presentation of Self in Everyday Life*, Garden City, NY: Doubleday, Anchor Books.



- Goffman, E. (1961). *Encounters*, Indianapolis: Bobbs-Merrill.
- Gomolińska, A. (1999). Rule complexes for representing social actors and interactions, *Studies in Logic, Grammar, and Rhetoric* 3(16): 95–108.
- Hall, J. (2000). A Theory of War and Peace. Presentation at the Swedish Collegium for Advanced Study in the Social Sciences, Uppsala, Sweden, February 3, 2000.
- Hardin, R. (1982). *Collective Action*, Baltimore: John Hopkins University Press.
- Harre, H. (1979). *Social Being*, Oxford: Blackwell.
- Harre, H. & Secord, P. F. (1972). *The Explanation of Social Behavior*, Oxford: Blackwell.
- Hechter, M. (1987). *Principles of Group Solidarity*, Berkeley: University of California Press.
- Hollis, M. (1987). *The Cunning of Reason*, Cambridge: Cambridge University Press.
- Machado, N. & Burns, T. R. (1998). Complex social organization: multiple organizing modes, structural incongruence, and mechanisms of integration, *Public Administration* 76: 355–386.
- Olson, M. (1968). *The Logic of Collective Action*, New York: Schocken.
- Parsons, T. (1968) [1937]. *The Structure of Social Action*, New York: Free Press.
- Rasmussen, E. (1989) *Games and Information: An Introduction to Game Theory*, Oxford: Basil Blackwell.
- Scharpf, F. W. (1997). *Games Real Actors Play: Actor-Centered Institutionalism in Policy Research*, Colorado, Colorado: Westview Press.
- Tsebelis, G. (1990). *Nested Games: Rational Choice in Comparative Politics*, Berkeley: University of California Press.
- Von Neumann, J. & Morgenstern, O. (1972). *Theory of Games and Economic Behaviour*, Princeton: Princeton University Press.
- Winch, P. (1958). *The Idea of a Social Science and its Relation to Philosophy*, London: Routledge and Kegan Paul.